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“USDA NRCS *Technology News*” is a monthly electronic information piece provided by Science and Technology. It is designed to deliver pertinent information to our customers about new technology, products, and services available from the Soil Survey and Resource Assessment and the Science and Technology deputy areas. **“USDA NRCS *Technology News*”** is in a format that is available to all NRCS field staff.

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MESSAGE FROM THE DEPUTY CHIEFS

Lawrence E. Clark and Maurice J. Mausbach

Depending on your background and experience, the term “frontier” probably conjures up a number of images in your mind — perhaps covered wagons making their way across the Great Plains, or Davey Crockett with his flintlock rifle, or even Explorer on its way to Mars. Those of us involved in science and technology are accustomed to the concept of frontiers. In the past several decades, new discoveries in electronics, genetics, bioengineering, and other technologies have advanced the frontiers of agriculture. Some scientists say that these changes have brought tremendous benefits to agriculture and to the world population. Others believe that at least some of them have worked to its detriment.

There are other frontiers in the world around us that are less well known than the ones we read about in the media and scientific journals. One of these is contemporary population change. The population count that is taken every 10 years by the U.S. Census frequently yields information about trends that can have significant implications for land use and natural resource conservation. According to the 2000 Census released this spring, the frontier has returned to the Great Plains.

In the early 1860’s, the American frontier was defined in part by the Homestead Act, which brought Northern European immigrants to the Great Plains for the free parcels of land promised to them by that Act. By the 1890 Census, the frontier was declared closed because it was “no longer possible to trace a continuous line defining where population ranged from two to six people per square mile.”(1) In 1899, Frederick Jackson Turner, a professor of history at Johns Hopkins University, predicted a painful transition for Americans from their view of America as a land of endless space to one in which land has a finite quantity.

In a remarkable turnabout, the frontier defined by Turner and his contemporaries is open once again due to a combination of demographic, economic, and social changes in the Great Plains. A recent New York Times article reported that there are more bison on the Plains than at any time since the late 1870’s.(2) At the turn of the century only a few hundred buffalo (genus Bison) were left in the West. Now there are about 300,000. More than 30 tribes in the northern Plains are controlling large herds on land where bison, unlike cattle, need no help to flourish. In addition, a third of the nation’s accredited Indian colleges offer courses in bison management.(3) The Great Plains have become a “modern day frontier.”

Another view of the modern day frontier is found in a recent book by Australian scientist Tim Flannery. In The Eternal Frontier, Flannery writes that “North America is a 65-million-year evolutionary work in progress, a series of contingencies, causal forces, drastic upheavals, and transitional phases, amid which can be seen a single recurrent theme: the frontier.”(4) Flannery’s view of the frontier is different from the one proposed more than 100 years ago by Frederick Turner. Where Turner viewed the frontier as an advancing line to the west that would eventually run out of space, Flannery sees it as a

series of ecosystems within that space. He notes that there are elements of frontier still at issue in ecosystems throughout the country that are still at risk.

Is it possible for us to find modern day frontiers in the work we do? Certainly many of the natural resource conservation issues we address would fit Tim Flannery's definition of "limited frontiers at issue" — ecosystems, water quality, native plants, and animal waste management, to name a few. In addition, the Indian tribal return to raising bison on the Great Plains provides the opportunity for us to provide technical assistance to tribes whose frontier history is living in harmony with the land.

According to Flannery, "The very essence of the frontier experience lies in the extent of its resources, and when resources are boundless, why conserve them or even utilize them efficiently? The principal goal is to exploit them as quickly as possible, then move on."⁵ When we work with farmers, ranchers, and other landowners to conquer modern day natural resource frontiers, we can accomplish conservation, not exploitation. We may not see ourselves as modern day Davey Crocketts, or even Mars explorers, but the frontiers that challenge us are just as significant.

1. Fish, Larry, "On Great Plains, a Population Drain," Philadelphia Inquirer, April 29, 2001.
2. Egan, Timothy, "As Others Abandon Plains, Indians and Bison Come Back," New York Times, May 27, 2001.
3. Ibid.
4. Quammen, David, "Your Tired. Your Poor. Your Arctostylops," Book Review, New York Times, May 20, 2001.
5. Ibid.

CONSERVATIONIST'S CORNER

Cecil B. Currin, State Conservationist, Massachusetts

Although science has long been the foundation of our Agency's work, the marriage of science and technology has effectively launched NRCS into the heart of modern conservation issues. In Massachusetts, this means striking a balance between urban and agricultural interests. Although our state is small, our population exceeds 6.3 million. This population density exerts pressure on our limited natural resources, creating conservation opportunities across a variety of landscapes.

On the southeastern coast where urban encroachment is pressing toward cranberry farms, our soil scientists have discovered that their ground-penetrating radar (GPR) technology is broadly popular. The GPR unit can sense what is below ground without ever digging a hole. Instead, electromagnetic waves penetrate the soil to determine depths, geometry, and underground features. When the returning impulses are charted on a 3-D model, our scientists instantly have a picture profile of what is under ground. The practical uses of this technology range from mapping ground water sources to pinpointing variances in soils to locating buried objects – even dead bodies. NRCS can analyze cranberry bogs,

locate Native American artifacts, and even assist with murder investigations. Support for GPR technology comes from the National Soil Survey Center.

The urban Charles River Watershed Association has collaborated with NRCS to protect the quality of their river and maintain its health for boating, swimming, and kayak racing. We were asked to evaluate stormwater management practices, with guidance and technical support from the Watershed Science Institute. As a study of applied science, the findings can be transferred to other urban corridors in New England.

Years ago, tension mounted between cranberry growers and adjacent communities who shared a limited supply of freshwater, creating a role for The Conservation Partnership. NRCS initiated a pilot project with special EQIP funds, working one-on-one with cranberry growers, to provide accelerated conservation planning on cranberry land—planning services that included the use of Geographic Information Systems (GIS). Thanks to GIS, we struck a balance between the water quality concerns of ever-growing communities and the needs of adjacent farmers, restoring hope and trust on the urban interface.

Our success with cranberry planning lit enough sparks to justify GIS technology for broader conservation planning activities. As a result, every field office in Massachusetts is running ArcView® and MassGIS®. We also installed the Customer Service Toolkit product, developed by the Information Technology Center, to extend the GIS technology one step further. Thanks to these tools, we can incorporate related data and aerial photos into the conservation plans we give our farmers. Again, science meets technology for the benefit of our customers.

Although urban sprawl is a hot conservation topic, especially in our NRI report, we remain very focused on delivering programs and services to our 5,574 farmers. Because the family farm is key to both a healthy environment and a healthy economy, we provide assistance to farmers to help keep them on their land and profitable in their business. In fact, NRCS handles the conservation components of several Massachusetts sustainability initiatives that serve to preserve open space and keep farmers in business—an arena where conservation is front and center—further solidifying the relationship between rural and urban. And, at the end of the day, we know this is good for tourism, good for the local economy, good for wildlife, good for consumers of food, and good for the environment.

NEW PRODUCTS AND SERVICES

New Tool Provides Access to Soil Survey Maps and Data

The Soil Data Viewer (SDV) has been developed as a companion tool to the Customer Service Toolkit (CST). SDV provides access to the soil survey database for processing and displaying soil data and information through a list of interpretations, soil

interpretative groups, and soil physical and chemical properties. It can be used as a stand-alone tool independent of CST and in either GIS or non-GIS mode.

SDV is an easy to use tool for geospatial analysis of soil information for resource assessment and management. An extension to ArcView®, it allows the user to easily create tabular reports or soil-based thematic maps and offers several map unit component processing methods. SDV shields the user from the complexity of the soil database and incorporates rules for appropriate use of soil data.

Version 3.0 of SDV, to be released soon, uses the new SSURGO Version 2 data format, which includes soil data and interpretations generated by NASIS (National Soil Information System). States are beginning to generate and certify SSURGO datasets in this format.

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Pasture Condition Scoring Tools Aid Pasture Management

Revisions and additions to the National Range and Pasture Handbook by the Grazing and Technology Institute will result in three new products: “Guide to Pasture Condition scoring,” “Pasture Condition Score Sheet,” and “Pastureland Inventory Worksheet.” The guide introduces the concept of pasture condition scoring and how it can assist in pasture management decisionmaking. The score sheet explains the method and meaning of the scoring system. The inventory worksheet is a form that facilitates a detailed account of plant species composition and ground cover.

Pasture condition scoring is a science-based scoring procedure used to evaluate the condition of the pasture plant community and the soil resource in the pasture. It is designed primarily to point out where management shortfalls exist in the current pasture management program. The score sheet and rating system look at 10 general indicators of pasture condition to decide how each is faring. Further, rating causative factors makes it clearer which corrective actions need to take place, which then becomes part of the conservation planning process with the producer.

These tools will be available in the revised National Range and Pasture Handbook expected to be released soon.

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Stress Management Fact Sheet Now Available

The "Stress Management" fact sheet from the People, Partnerships, and Communities (PPC) series is now available from the Social Sciences Institute (SSI). It defines stress and related symptoms, provides tips to identify job stress, and offers stress management tips and techniques. Additional resources are identified for those who want to explore the topic in more depth. Available now by request from <ssinter2@po.nrcs.usda.gov> or (616) 942-1503, this PPC will be placed on the SSI web site with the rest of the series.

The PPC series, providing basic and concise information on a variety of topics of interest and relevancy to The Conservation Partnership, and the SSI's other products are available from the SSI web site <www.ssi.nrcs.usda.gov>. The current SSI Product Catalog is free from <ssinter2@po.nrcs.usda.gov> or (616) 942-1503.

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Update Underway for Section 22 of National Engineering Manual

The Snow Survey and Water Supply Forecasting Program (SS/WSF) lacks modern documentation of its functions. Therefore, the National Conservation Engineering Division is updating the SS/WSF section (NEH-22) of the National Engineering Handbook into the revised NRCS Directive system under 210-522 (Policy Manual) and 210-622 (Technical Handbook). Staff of the Water and Climate Services Branch of the National Water and Climate Center in Portland, Oregon will compile and publish 210-522. The key elements of the new Section 522 have been identified and it is anticipated that the document will be available in 2002.

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TECHNOLOGY RELATED TO AGENCY KEY DECISIONS

The Agency leadership has identified two key Agency decisions for emphasis in FY 2001. Conservation planning and nutrient management are at the top of the list of work for the Agency. Products and services that are most closely related to these two key Agency decisions will be identified in USDA NRCS Technology News from time to time in this section.

Manure Management Workshops Present Newest Methodologies

Management of agricultural animal manure is currently one of NRCS's highest priorities. The Agency provides technical assistance in the design of thousands of manure storage ponds and lagoons throughout the country every year. Ground conditions at many facilities require the installation of liners (hydraulic barriers) to meet state regulatory seepage requirements to avoid contamination of ground water. Methodologies in the NRCS Agricultural Waste Management Field Handbook (AWMFH) are used to determine whether site conditions are satisfactory or what engineering design measures may be needed to improve the site for manure containment.

Seven 1-day workshops on "Seepage Control in Manure Storage Ponds" were sponsored by the Conservation Engineering Division in FY 2001. This year's workshops, held in Alaska, Colorado, Idaho, Maryland, Michigan, Oregon, and Virginia, reached 281 of the NRCS employees and partners who must address a rapidly changing regulatory environment in animal waste containment. Since 1998, 23 workshops have been attended by 884 NRCS employees and partners (60 percent and 40 percent, respectively).

The classroom presentation covers geologic investigation, design, and construction of liners. Several new NRCS engineering references are discussed, including Chapter 10, Appendix 10D, Part 651, AWMFH, "Geotechnical, Design, and Construction Guidelines for Controlling Seepage in Manure Storage Facilities;" Chapter 7, Part 651, AWMFH, "Geology and Ground Water Investigations;" and several new National Conservation Practice Standards. Construction and material specifications, as well as several case histories on various types of flexible membrane liners, are also presented.

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TECHNOLOGICAL ADVANCES

New WIN-PST Data Available Soon

A semi-annual update of Windows Pesticide Screening Tool (WIN-PST) pesticide database will be completed this fall. This database includes pesticide physical properties,

toxicity thresholds, and product registration information. New pesticides will be included. An updated WIN-PST pesticide database will be available on the National Water and Climate Center (NWCC) web site.

Current WIN-PST soil databases are predominantly populated with Map Unit Interpretation Record (MUIR) data. Upon request, individual soil survey areas were added or updated in WIN-PST soil databases using NASIS 4.1 SSURGO downloads. With NASIS 5.0, the SSURGO download became unusable for WIN-PST. NASIS developers were asked to create a new WIN-PST export function for the new NASIS 5.0 SSURGO Version 2 Microsoft Access Template Database. This new export function is being tested, and it is expected that NASIS 5.0 soil data will be available for use in WIN-PST by the end of this fiscal year. The new WIN-PST - NASIS 5.0 soil databases will be available on the NWCC web site.

The first WIN-PST Review Team meeting is scheduled for September 11-13 in Reno, Nevada. Input from regional, state, and field level users will be solicited, and plans for the next version of WIN-PST will be developed.

The NWCC web site

<<http://www.wcc.nrcs.usda.gov/water/quality/common/pestmgt/email.htm>> has full contact information for the WIN-PST Technology Team.

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TECHNOLOGY TRANSFER

More Credits for NRCS and PLANTS Information

A commercial web site for wild flower information and products, Easyliving Wildflowers at <www.easywildflowers.com>, identifies and credits NRCS and PLANTS as information sources. The site provides a distribution map and other pertinent information for a wide variety of native wildflowers for home landscaping. The credits appear on a number of the individual wildflower pages, such as the one for passion flower at <www.easywildflowers.com/quality/pas.incar.htm>. Although a hyperlink is not provided, the National Plant Data Center, PLANTS web address, and USDA NRCS are clearly identified and credited.

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TRAINING

Wetland Restoration Instruction Emphasizes Hydrologic Diversity

Recent cooperative initiatives between the Wetland Science Institute and the NRCS Watershed and Wetlands Division have resulted in workshops and training sessions that unveiled new guidance and technology helpful to field staff to restore hydrologic diversity in wetlands. Creating hydrologic diversity in wetland restoration projects can greatly enhance benefits to fish and wildlife, improve the chances for a successful restoration, and contribute to other wetland functions as well, such as flood storage, water quality improvement, and groundwater recharge.

A Macro and Microtopography Workshop held in Texas emphasized landscape designs that can substantially increase habitat and biotic diversity on restoration and enhancement sites. Advanced wetland restoration courses in Arkansas, Michigan, and Washington were sponsored by the National Employee Development Center (NEDC). Workshops covered related aspects of the Wetland Reserve Program (WRP) and provided demonstration and on-site training on techniques for creating hydrologic diversity, and included new instruction on the design and management of wetland restoration projects for specific groups of wildlife. Basic NEDC wetland restoration courses are continuing this year and include similar instruction. Courses were held in New York and Iowa, and the South Carolina course will be completed in early September.

Several associated products have been developed. The Wetland Windows CD-ROM, a self-contained PowerPoint presentation on the functions and values of wetlands and how efforts in wetland restoration benefit the resource, was distributed to states in May. Written in lay terms, it is useful as a marketing tool for perspective WRP participants. A videotape on developing macro and microtopography for wetland restoration projects has been distributed to states and provided to participants in this year's training.

Another product, under development, is the Wetland Restoration, Management, and Monitoring Handbook. The Handbook has detailed guidance on the restoration of hydrologic diversity as well as many other aspects of wetland restoration. A CD of the draft handbook has been provided to all participants in this year's training. The handbook is receiving final technical edits and will be issued soon as part of the directives system.

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HONORS

NRCS Irrigation Engineer Receives Leadership Award

Tom Spofford, irrigation engineer with the National Water and Climate Center, is to receive the Irrigation Association's 2001 Person of the Year Award for his national leadership in irrigation science in NRCS and various national organizations. For the past 7 years, Spofford has been the Agency's lead engineer for irrigation technology development and transfer. During his 30-year NRCS career Spofford initiated and served on numerous professional and interagency working groups and committees to develop irrigation science and technology.

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